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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: NIGEL B. ALDRIDGE ET AL.
Serial No.: NOT YET ASSIGNED PCT No.: PCT/GB01/00038
Filed: MARCH 19, 2002
Title: IMPROVEMENTS RELATING TO INTERFACING EMBEDDED
OPTICAL TRANSMISSION STRUCTURES

PRELIMINARY AMENDMENT

Box PCT
Commissioner for Patents
Washington, D.C. 20231

March 19, 2002

Sir:

Please enter the following amendments to the claims, prior to the examination of the application during the U.S. National Phase.

IN THE CLAIMS:

Please cancel Claim 65, without prejudice to or disclaimer of the subject matter thereof and amend the remaining claims as follows: (A copy of a marked up version with markings to show changes made is attached hereto.)

3. (Amended) A method according to Claim 1, wherein the step of forming a passageway comprises drilling or machining through the composite

from an exterior surface thereof to the first optical transmission means and severing the first optical transmission means.

4. (Amended) A method according to Claim 3, wherein the step of providing an optical interface surface comprises polishing a severed portion of the first optical transmission means.

5. (Amended) A method according to Claim 1, wherein the step of forming a passageway comprises: drilling or machining through the composite to the first optical transmission means; providing the passageway with a protective plug for closing the passageway; and removing the protective plug prior to the step of forming an optical connection.

6. (Amended) A method according to Claim 1, wherein the step of forming a passageway comprises irradiating an exterior surface of the composite using a laser to access the first optical transmission means.

8. (Amended) A method according to Claim 6, further comprising preventing light used in the laser irradiation step from being optically coupled with the first optical transmission means.

10. (Amended) A method according to Claim 8, wherein the preventing step comprises allowing the light used in the laser machining step to be transmitted to at least one light beam absorbing means provided within the composite.

11. (Amended) A method according to Claim 1, wherein the step of locating the position of the first optical transmission means comprises using an embedded detectable position marker to indicate the location of the first optical transmission means within the composite.

12. (Amended) A method according to Claim 1, wherein the step of forming a passageway comprises using a depth marker to indicate when the passageway has been formed to the correct depth.

13. (Amended) A method according to Claim 12, wherein the depth marker comprises the position marker.

14. (Amended) A method according to Claim 11, wherein the position marker or the depth marker comprises a sacrificial coating and the laser irradiation step further comprises removing the coating after formation of the passageway to access the first optical transmission means.

15. (Amended) A method according to Claim 11, wherein the step of locating the position of the first optical transmission means or the step of forming a passageway comprises locating the position of the position marker or the depth marker within the composite using an imaging technique.

17. (Amended) A method according to Claim 2, wherein the step of establishing an optical connection comprises providing a thermal expanded core optical fibre at the optical interface surface.

18. (Amended) A method according to Claim 1, further comprising aligning an interface means within the passageway to be in optical communication with first optical transmission means at the interface surface, and arranging for the interface means to be accessible to the second optical transmission.

21. (Amended) A method according to Claim 1, further comprising optically processing light to or from the first optical transmission means by an optical processing means embedded within the composite and optically connected to the first optical transmission means.

24. (Amended) A method according to Claim 21, wherein the step of optically processing light comprises collimating a light beam.

26. (Amended) A method according to Claim 21, further comprising providing the optical processing mean on a micro-substrate and securing the first optical transmission means to the optical processing means using the micro-substrate.

27. (Amended) A method according to Claim 26, further comprising providing the alignment structure on the micro-substrate.

28. (Amended) A method according to Claim 1, wherein the first optical transmission means comprises an elongate structure and the step of establishing an optical connection is effected to a side of the elongate structure.

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35. (Amended) An optical coupling according to Claim 33, wherein the passageway comprises a drilled or machined orifice through the composite from an exterior surface thereof to the first optical transmission means to a depth sufficient to sever the first optical transmission means.

36. (Amended) An optical coupling according to Claim 35, wherein the optical interface surface comprises a polished severed portion of the first optical transmission means.

37. (Amended) An optical coupling according to Claim 33, wherein the passageway comprises a drilled or machined orifice through the composite to the first transmission means; and a protective plug provided in the passageway for closing the passageway, the protective plug being removable prior to forming an optical connection.

38. (Amended) An optical coupling according to Claim 33, wherein the passageway comprises a laser irradiated orifice through the composite to the first optical transmission means.

41. (Amended) An optical coupling according to Claim 39, wherein the preventing means comprises at least one light beam absorbing means embedded at an appropriate position within the composite.

42. (Amended) An optical coupling according to Claim 33, wherein the locating means comprises an embedded detectable position marker to indicate the position of the first optical transmission means within the composite.

43. (Amended) An optical coupling according to Claim 33, further comprising a depth marker embedded within the composite to indicate when the passageway has been formed to the correct depth.

44. (Amended) An optical coupling according to Claim 43, wherein the depth marker comprises the position marker.

45. (Amended) An optical coupling according to Claim 42, wherein the position marker or the depth marker comprises a sacrificial coating which is arranged to be removable after the formation of the passageway to access the first optical transmission means.

48. (Amended) An optical coupling according to Claim 34, wherein the optical interface surface is provided at a thermally expanded core optical fibre connected to the first optical transmission means.

49. (Amended) An optical coupling according to Claim 33, further comprising an interface means alignable within the passageway to be in optical communication with first optical transmission means at the optical interface surface, the interface means being arranged to be accessible to the second optical transmission means.

51. (Amended) An optical coupling according to Claim 33, further comprising optical processing means embedded within the composite, the optical processing means being optically connected to the first optical transmission means for processing light to or from the first optical transmission means.

54. (Amended) An optical coupling according to Claim 51, wherein the optical processing means comprises means for collimating a light beam.

56. (Amended) An optical coupling according Claim 51, wherein the optical processing means comprises at least one of the group comprising an optical grating element, a wave-guide, a wave plate, a hologram and an optical filter.

57. (Amended) An optical coupling according to Claim 51, further comprising a micro-substrate on which the optical processing means is provided and secured to the first optical transmission means.

58. (Amended) An optical coupling according to Claim 57, wherein the alignment structure is provided on the micro-substrate.

59. (Amended) An optical coupling according to Claims 33, wherein the first optical transmission means comprises an elongate structure and the optical interface surface is provided at a side of the elongate structure.

64. (Amended) An optical coupling according to Claims 33, wherein the first and/or second optical transmission means comprises an optical fibre.

(Applicant's Remarks are set forth hereinbelow, starting on the following page.)

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REMARKS

Entry of the amendments to the claims, before examination of the application in the U.S. National Phase is respectfully requested.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #2101/50770).

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE TO THE CLAIMS

3. (Amended) A method according to [Claim 1 or 2,] Claim 1, wherein the step of forming a passageway comprises drilling or machining through the composite from an exterior surface thereof to the first optical transmission means and severing the first optical transmission means.

4. (Amended) A method according to Claim 3, [as dependent on Claim 2,] wherein the step of providing an optical interface surface comprises polishing a severed portion of the first optical transmission means.

5. (Amended) A method according to [any preceding claim,] Claim 1, wherein the step of forming a passageway comprises: drilling or machining through the composite to the first optical transmission means; providing the passageway with a protective plug for closing the passageway; and removing the protective plug prior to the step of forming an optical connection.

6. (Amended) A method according to [Claim 1 or 2,] Claim 1, wherein the step of forming a passageway comprises irradiating an exterior surface of the composite using a laser to access the first optical transmission means.

8. (Amended) A method according to [Claim 6 or 7,] Claim 6, further comprising preventing light used in the laser irradiation step from being optically coupled with the first optical transmission means.

10. (Amended) A method according to [Claim 8 or 9,] Claim 8, wherein the preventing step comprises allowing the light used in the laser machining step to be transmitted to at least one light beam absorbing means provided within the composite.

11. (Amended) A method according to [any preceding claim,] Claim 1, wherein the step of locating the position of the first optical transmission means comprises using an embedded detectable position marker to indicate the location of the first optical transmission means within the composite.

12. (Amended) A method according to [any preceding claim,] Claim 1, wherein the step of forming a passageway comprises using a depth marker to indicate when the passageway has been formed to the correct depth.

13. (Amended) A method according to Claim 12, [as dependent from Claim 11,] wherein the depth marker comprises the position marker.

14. (Amended) A method according to [any of Claims 11 to 13 as dependent from any of Claims 6 to 10,] Claim 11, wherein the position marker or the depth marker comprises a sacrificial coating and the laser irradiation step further comprises removing the coating after formation of the passageway to access the first optical transmission means.

15. (Amended) A method according to [any of Claims 11 to 14,] Claim 11, wherein the step of locating the position of the first optical transmission means or the step of forming a passageway comprises locating the position of the

position marker or the depth marker within the composite using an imaging technique.

17. (Amended) A method according to Claim 2, [or any of Claims 3 to 16 as dependent from Claim 2,] wherein the step of establishing an optical connection comprises providing a thermal expanded core optical fibre at the optical interface surface.

18. (Amended) A method according to [any preceding claim,] Claim 1, further comprising aligning an interface means within the passageway to be in optical communication with first optical transmission means at the interface surface, and arranging for the interface means to be accessible to the second optical transmission.

21. (Amended) A method according to [any preceding claim,] Claim 1, further comprising optically processing light to or from the first optical transmission means by an optical processing means embedded within the composite and optically connected to the first optical transmission means.

24. (Amended) A method according to [any of Claims 21 to 23,] Claim 21, wherein the step of optically processing light comprises collimating a light beam.

26. (Amended) A method according to [any of Claims 21 to 25,] Claim 21, further comprising providing the optical processing mean on a micro-substrate and securing the first optical transmission means to the optical processing means using the micro-substrate.

27. (Amended) A method according to Claim 26, [ad dependent on Claim 19 or 20,] further comprising providing the alignment structure on the micro-substrate.

28. (Amended) A method according to [any preceding claim,] Claim 1, wherein the first optical transmission means comprises an elongate structure and the step of establishing an optical connection is effected to a side of the elongate structure.

35. (Amended) An optical coupling according to Claim 33, [or 34,] wherein the passageway comprises a drilled or machined orifice through the composite from an exterior surface thereof to the first optical transmission means to a depth sufficient to sever the first optical transmission means.

36. (Amended) An optical coupling according to Claim 35, [and dependent on Claim 34,] wherein the optical interface surface comprises a polished severed portion of the first optical transmission means.

37. (Amended) An optical coupling according to [any of Claims 33 to 36,] Claim 33, wherein the passageway comprises a drilled or machined orifice through the composite to the first transmission means; and a protective plug provided in the passageway for closing the passageway, the protective plug being removable prior to forming an optical connection.

38. (Amended) An optical coupling according to Claim 33, [or 34,] wherein the passageway comprises a laser irradiated orifice through the composite to the first optical transmission means.

41. (Amended) An optical coupling according to Claim 39₁ [or 40,
wherein the preventing means comprises at least one light beam absorbing
means embedded at an appropriate position within the composite.

42. (Amended) An optical coupling according to [any of Claims 33 to 41,
Claim 33, wherein the locating means comprises an embedded detectable
position marker to indicate the position of the first optical transmission means
within the composite.

43. (Amended) An optical coupling according to [any of Claims 33 to 42,
Claim 33, further comprising a depth marker embedded within the composite to
indicate when the passageway has been formed to the correct depth.

44. (Amended) An optical coupling according to Claim 43₁ [as dependent
on Claim 42,₁ wherein the depth marker comprises the position marker.

45. (Amended) An optical coupling according to [any of Claims 42 to 44
as dependent from any of Claims 38 to 41,₁ Claim 42, wherein the position
marker or the depth marker comprises a sacrificial coating which is arranged to
be removable after the formation of the passageway to access the first optical
transmission means.

48. (Amended) An optical coupling according to Claim 34₁ [or any of
Claims 35 to 47 as dependent from Claim 34,₁ wherein the optical interface
surface is provided at a thermally expanded core optical fibre connected to the
first optical transmission means.

49. (Amended) An optical coupling according to [any of Claims 33 to 48,] Claim 33, further comprising an interface means alignable within the passageway to be in optical communication with first optical transmission means at the optical interface surface, the interface means being arranged to be accessible to the second optical transmission means.

51. (Amended) An optical coupling according to [any of Claims 33 to 50,] Claim 33, further comprising optical processing means embedded within the composite, the optical processing means being optically connected to the first optical transmission means for processing light to or from the first optical transmission means.

54. (Amended) An optical coupling according to [any of Claim 51 to 53,] Claim 51, wherein the optical processing means comprises means for collimating a light beam.

56. (Amended) An optical coupling according [any of Claims 51 to 55,] Claim 51, wherein the optical processing means comprises at least one of the group comprising an optical grating element, a wave-guide, a wave plate, a hologram and an optical filter.

57. (Amended) An optical coupling according to [any of Claims 51 to 56,] Claim 51, further comprising a micro-substrate on which the optical processing means is provided and secured to the first optical transmission means.

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58. (Amended) An optical coupling according to Claim 57, [as dependent on any of Claims 51 to 56 as dependent from Claim 50,] wherein the alignment structure is provided on the micro-substrate.

59. (Amended) An optical coupling according to [any of Claims 33 to 58,] Claims 33, wherein the first optical transmission means comprises an elongate structure and the optical interface surface is provided at a side of the elongate structure.

64. (Amended) An optical coupling according to [any of Claims 33 to 63,] Claims 33, wherein the first and/or second optical transmission means comprises an optical fibre.